ENERGY CONSERVATION
AND GREEN BULDING

By

Martin Cantu Jr.
Planning & Development Services
e136011

For

School-to-Work Program

City of Houston
Department of Public Works and Engineering

Code Enforcement
Mrs. Lisa Fleming Brown
Assistant Code Administrator

November 20, 2008

TABLE OF CONTENTS

ENERGY CONSERVATION AND GREEN BUILDING

INTRODUCTION

The goal aimed to be achieved by this assembled research paper is to understand and identify how the environmental movement has affected energy conservation and green building in and around the City of Houston. This research paper will define energy conservation and green building to assist readers of how important the significant impact of energy conservation and green building is in sustaining the ever changing environment of today.

Authorization

This paper was authorized by Lisa Fleming Brown for the School-to-Work program and was written by Martin Cantu Jr. The assembled research paper was submitted on November 20, 2008.

Statement of Purpose

The purpose of this paper is to help introduce the concepts and practices the City of Houston has adopted in energy conservation and green building in relation to the environmental movement of today.

Scope

This research paper will help you understand the importance of energy conservation and green building. The information in this paper will focus on key points my internship experience and additional research have unveiled. Mainly the environmental impact of the City of Houston, and what we are doing to counter these effects aiming towards environmental awareness.

Sources and Methods

The background information gathered in this research paper derived from magazines, books, classroom textbooks, websites, and journals of which were written by highly qualified, experienced, and reliable people. Additional information will be provided by fellow co-workers and experiences my internship has exposed to me.

Report Organization

The research paper will begin with the summary of the Department of Public Works and Engineering section of Code Enforcement. I will show what the City of Houston is doing to Green Houston and the importance of environmental awareness as a whole. I will also show the important roles that energy conservation and green building play for a better understanding of how they impact the environment around us. Next, I will define energy conservation and show its importance in the City of Houston's sustainability. I will give examples of different types of renewable energy the City of Houston is incorporating and an understanding of how they impact society. Lastly, I will attempt to show what green building is, and why it is important to reduce the environmental footprint we leave behind. In addition, I will be showing initiatives the City of Houston has taken in regards to our environment. I will also help with understanding different types of renewable resources and materials used in green building that impact the city's environmental sustainability.

CODE ENFORCEMENT

The City of Houston Public Works and Engineering Department provides basic services that affect the daily lives of everyone who live and work in Houston. I began my internship in the Planning and Development section of the City of Houston. Within this section is the Code Enforcement group which I am a part of. The Code Enforcement group has three hundred plus employees and regulates all construction within the city limits. This group enforces the construction codes for both residential and commercial construction. Being part of this group brought about new insights that I had never been exposed to before. I began learning about all types of codes that are enforced for the safety of the general public. A couple of things I found really interesting was how the City of Houston is becoming environmentally aware of the significant impact we have on our environment. I have always cared about how many of the things we do everyday affect the environment. Many of us do not realize that everything we do affects the environment in some way. So seeing the City of Houston take initiative by enforcing certain energy conservation codes and promoting green building rather surprised me. Mayor Bill White has started a movement called, Green Houston in effort to work harder than ever in promoting Houston to go green. The City of Houston has even started a website to help educate people about going green. The website is www.greenhoustontx.gov and has helpful links to help the citizens of Houston understand ways to take part in the greening of Houston.

Green Houston!

The City of Houston is taking the lead in going green. Houston is in a unique position to help lead the nation in making power more affordable for all Americans. The website,

www.greenhoustontx.gov is an important tool to help educate citizens about going green. Mayor Bill White encourages the citizens of Houston to take time and explore the website to learn what they can do to help make Houston green. The City of Houston itself has started by adopting energy conservation codes and promoting green building to help alleviate the footprint we leave behind. In fact, the EPA's Green Power Partnership hailed the City of Houston as the No.1 municipal purchaser of green power in the nation and a crucial leader in the alternative energy trend, with 25% of the City of Houston's total electricity purchased from wind energy. Also, the Code Enforcement group plays a major part ensuring Houston citizens understand the importance of energy conservation and green building. Since 2002 the Code Enforcement group has adopted more stringent codes, setting a higher standard for other cities to follow. The City of Houston, energy capital of the world, is becoming a marketable city attracting businesses from all over the world and becoming the energy efficient capital by going green.

Energy Conservation

The Code Enforcement group is a regulatory group that enforces steps toward increased energy independence. These regulatory steps often start off by the reviewing of energy codes and ordinances through a committee process. Next, a draft of the new energy requirements is put into code language and sent off for legal review. The review of the new energy conservation codes are then adopted through city council. Immediately after the adoption process, Code Enforcement officials meet with stakeholders and train the industry and the staff of the code ordinances made. After a brief adoption delay, the new energy efficiency codes and ordinances are enforced to reduce overall energy consumption. Houston upgraded the commercial energy code in April, 2008 which will

allow new buildings to be significantly more energy efficient than under prior codes. This helps save money for the owners and user's, helps reduce our dependence on fossil fuels, and cuts back on the need to build additional energy generating plants. Energy conservation has been called the "least-cost" energy strategy and for a good reason. Energy conservation does more than just save money. It reduces environmental and social costs as well. It makes financial sense, good for our country, and great for our future.

Green Building

Code Enforcement is also part of an important voluntary effort to promote green building. Unlike the regulatory aspect of enforcing energy conservation codes, green building education is a voluntary energy conservation role that Code Enforcement oversees. In addition to the Mayor's Green Building Advisory Council, the City of Houston is in the process of constructing a Green Building Resource Center which will educate citizens and business owners on green building and green building products. This will be an education center where the public can learn and be advised of the benefits of going green. Classes on green building will also be taught at the center. Citizens will be able to see demos of green building concepts like a green roof, rain gardens, and other displays. The purpose of the Center is to raise awareness of green building, and educate the public about what they can do to be environmentally friendly. Green building options are the next step in becoming a healthier environment and having a significant impact on a city's sustainability.

Environmental Awareness

There are too many of us using too many non-renewable resources. The convenience of oil is the main reason why we are so dependent on these harmful non-renewable resources. We are just realizing the damage we are committing by not making wise decisions and caring for our surroundings, mainly being environmentally aware. We have witnessed in recent years, the highest average temperatures since the last ice age. This may not seem like a big difference but a few degrees of change is what actually put us in an ice age. This is a serious fact that people need to react to. It is a little too late to proactively change our ways, but it is not too late to become environmentally aware of our actions and change for the better. This is why the City of Houston is taking steps toward going green and emphasizing an interest of making the public aware of our actions affecting the environment.

ENERGY CONSERVATION

The United States is currently the largest single consumer of energy. Americans consume a disproportionate amount of the world's energy. But we can make a difference by conserving energy in our daily lives and by supporting the production of renewable energy. Energy conservation facilitates the replacement of non-renewable resources with renewable energy. Energy conservation is often the most economical solution to energy shortages, and is a more environmentally benign alternative to increased energy production. This is why the City of Houston is taking steps by committing to conserve energy working towards a sustainable future.

Energy Conservation Defined

This brings up the question of, "What is energy conservation and why is it so important?" Well, energy conservation is the practice of decreasing the quantity of energy used. This includes efficient energy use while still achieving the similar outcome. The U.S. Department of Energy categorizes national energy use in four broad sectors: transportation, residential, commercial, and industrial. So you may be thinking, "Why should I care?" Well, whenever we save energy we not only save money, we also reduce the demand for such fossil fuels as coal, oil, and natural gas. Less burning of fossil fuels also means lower emissions of carbon dioxide (CO2), the primary contributor to global warming, and other pollutants. It is our responsibility to be good stewards of the earth's resources for future generations.

Importance of Conservation

The earth is being depleted of its resources. The hole in the ozone layer is getting larger and forests are being depleted. Scientists are studying ways to develop alternate forms of energy, and utility bills just keep getting higher and higher. In today's world, it is very important that we teach the next generation how to conserve energy and resources. Taking care of our planet is of the utmost importance. The City of Houston taking steps of energy conservation and educating the public about going green helps our society recognize that the availability of our natural resources can affect the economy. Our society will then learn to seek out different energy alternatives that are renewable and do not affect the environment as much.

Renewable Energy

Most traditional energy sources are non-renewable. These resources are available in limited quantities and supply and produce so much pollution to process, that their use is inherently restricted. Either way, the result is the same: the cost of finding, processing and using traditional energy sources continues to escalate, while our reserve inventories of these resources continues to decline, that's a recipe for disaster. Using technology to harness the power of renewable energy resources, such as the sun and wind, will help us secure a safer, and a naturally cleaner, future for ourselves, our families, and our planet. A good example of this is using wind as a renewable energy resource. Wind is mainly used to generate electricity. The reason wind is a renewable resource is because wind will blow as long as the sun shines. Wind turbines are sprouting up all over the country in so called wind farms storing energy in electrical grids for use. Another good example of a renewable resource is harvesting the energy of the sun through solar cells. Solar cells are really called photovoltaic cell. These cells convert light directly into electricity. In a sunny climate, you can get enough power to provide electricity to run a 100W light bulb from just one square meter of solar panel. As a growing concern for alternative energy becomes popular and in dire need, we will understand that using renewable energy is the smart thing to do for a stronger economy, a cleaner environment and a greater energy security.

GREEN BUILDING

Commercial buildings have a significant impact on the environment. The design, construction and operation of buildings and structures within the City can have a significant impact on the City's environmental sustainability, resource usage, energy

efficiency, waste management, and health and productivity of residents, workers, and visitors. According to recent studies published by the United States Green Building Council (USGBC), and the U.S. Environmental Protection Agency (EPA), the construction, demolition and operation of buildings in the United States, collectively consume up to 37% of the total energy used, 12% of all fresh water supplies, 40% of all raw materials used: generates 36% of total emissions of anthropogenic carbon dioxide, the primary greenhouse gas associated with climate change. Because of this, many government officials, owners, developers, operators, and designers have looked at green building options, which are more environmentally friendly.

What is Green Building?

Green buildings can include, among other things, the use of certified sustainable wood products, extensive use of high recycled content products; recycling of waste that occurs during deconstructions, demolition and construction; orientation and design of a building to reduce the demand on heating, ventilating, and air conditioning systems; the use of HVAC systems that provide energy efficiency and improved air quality enhancement of indoor air quality by selection and use of construction materials that do not emit chemicals that are toxic or irritating to building occupants; the use of water conservation methods and equipment; and installation of alternative energy methods for supplemental energy production.

Importance of Green Building

Buildings are human habitat. The spaces in which we work, live, and learn are integral to our quality of life and the health of our planet. Green buildings are healthier, have a smaller environmental footprint, use less energy, and cost less. Green buildings are sited,

designed, constructed, and operated to enhance the well-being of their occupants and support a healthy community and natural environment. They are instrumental in helping society achieve "the triple bottom line" goal of economic, environmental, and success. A good example of why green building is so important is because according to the World Resources Institute, the U.S. has only 4.5% of the world's population but yet contributes 25% of the world's carbon dioxide emissions. I let you do the math. Green building is obviously the construction standard for the future and the smart solution for today.

Renewable Resources & Materials

The concept of green building incorporates and integrates a variety of strategies during the design, construction, and operation of building projects. The use of green building materials and products represents an important strategy in the design of a building. Green building materials are composed of renewable resources. These green materials and resources are environmentally responsible because impacts are considered over the life of the product. Many of these renewable resources are but not limited to, recycled content, natural and plentiful sustained resources, resource efficient processes, salvaged or refurbished building materials, and durable conventional products. Using renewable resources and materials are better for the environment. They reduce waste and help focus on the use of natural or least-processed materials that are as locally-sourced as possible. The principles are that Nature is the best designer and we should live as closely in harmony with it as possible. "The ultimate test of man's conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard." (Gaylord Nelson)

CONCLUSION

In conclusion, I hope this research paper will help you understand the importance of energy conservation and green building. The information in this paper attempted to focus on key points my internship experience and additional research have unveiled. I have come to understand the environmental impact the City of Houston has and their dedication to counter the effects we have on the environment. I hope you understand that serious environmental degradation is taking place with some destruction being irreversible. We need to act as a society and become aware of our environment.

SUMMARY

The research paper began with a brief description of the Department of Public Works and Engineering section of Code Enforcement. I showed what the City of Houston is doing to Green Houston and the importance of environmental awareness and why need to participate. I also showed the many important roles energy conservation and green building play to better understand how they impact the environment around us. I attempted to define energy conservation and show how it is important in the City of Houston's and where we live. I gave examples of different types of renewable energy the City of Houston is using and a basic understanding of how they impact our future. Lastly, I talked about green building, and why it is important to reduce the environmental footprint we leave behind. In addition, I showed the way the City of Houston has taken initiative in regards to our environment and gave you an idea of different types of renewable resources and materials used in green building impacting our city's environmental sustainability.

RECOMMENDATION

Much of the information provided about the City of Houston, is in regards to energy conservation and green building. This information will help you to have a basic understanding of the first step to ensuring the cities sustainable future. You will come to appreciate the actions the City of Houston is taking to properly engage in helping out the environment, and understand that we are in an ever-changing environment that needs us to respond with counter acting decisions, plan for the future, and monitor our environmental impact with the everyday things we do.

REFERENCES

Daniel, B. (2008). *MisLEEDing?*. Scientific American, Earth 3.0 Supplement, Vol. 18 Issue 4, p54-59, 5p.

Energy Design Update: Assessing the Performance of LEED Buildings. (2008, October 10). The Monthly Newsletter on Energy Efficient Housing. Vol. 28, No. 10.

Environmental Standard: Working Towards a Sustainable Future. (2008 May) City of Houston. Vol. 2, Issue 1.

Farrell, D., Nyquist, S.S. & Rogers, R.C. (2007) *Making the Most of the World's Energy Resources.* McKinsey Quarterly, 2007 Issue 1, p 20-33, 14p.

Gerfen, K. (2008). USGBC *to Hand over LEED Certification Process to GBCI.* ARCHITECT Magazine. p 1-3.

Gregory, D. (2007). *Green Building Materials*. Retrieved November 13, 2008, from website: http://www.ciwmb.ca.gov/greenBuilding/Materials/

McGuigan, C. & Stone D. (2008). *The Bad News About Green Architecture*. Newsweek, Vol. 152 Issue 11, p77-78, 2p.

Odom, J.D. & Scott R. (2008). *Hidden Risks of Green Buildings*. The Journal of HPAC Engineering, 36-46.

Solar Synapse: *Adopting the Sun. Solar Night Industries*. Modern Energy Solutions. (2007) Retrieved from website: http://www.solarsynapse.com/renewable.html

Suttell, R. (2005). *America's Cities "LEED" the Way*. Buildings Magazine. p 46-52.

Wind Energy: Energy From Moving Air. Retrieved on October 27, 2008 from website: http://www.eia.doe.gov/kids/energyfacts/sources/renewable/wind.html